

What is claimed is:

1. An isolated *Dirofilaria immitis* nucleic acid molecule, wherein said *Dirofilaria immitis* nucleic acid molecule hybridizes in a solution comprising 2X SSC and 0% formamide, at a temperature of 37°C, and washing in 1X SSC and 0% formamide at a temperature of 64°C, to a nucleic acid sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, and SEQ ID NO:10.
2. The nucleic acid molecule of Claim 1, wherein said nucleic acid molecule is selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, and SEQ ID NO:10.
3. The nucleic acid molecule of Claim 1, wherein said nucleic acid molecule comprises a nucleic acid sequence that is at least 85% identical to a nucleic acid sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, and SEQ ID NO:10, wherein determination of percent identity between molecules is made by a DNAsis™ computer program, using default parameters.
4. The nucleic acid molecule of Claim 1, wherein said nucleic acid molecule encodes a protein comprising an amino acid sequence selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9.
5. A recombinant molecule comprising a nucleic acid molecule as set forth in Claim 1 operatively linked to a transcription control sequence.

6. A recombinant virus comprising a nucleic acid molecule as set forth in
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Claim 1.

7. A recombinant cell comprising a nucleic acid molecule as set forth in
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Claim 1.

5 8. A method to produce a protein encoded by a nucleic acid molecule as set
forth in Claim 1, said method comprising culturing a cell transformed with a nucleic acid
molecule encoding said protein.

9. An isolated nucleic acid molecule selected from the group consisting of:
- (a) an isolated nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:10, SEQ ID NO:16, and SEQ ID NO:18; and (b) an isolated *Dirofilaria immitis* nucleic acid molecule comprising a
- homologue of any of said nucleic acid molecules of (a), or a complement of any of said homologues, wherein said homologue encodes a protein that elicits an immune response against a protein selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9, and wherein said homologue has at least a 50 contiguous nucleotide portion identical in
- sequence to a 50 contiguous nucleotide portion of a sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:10.
10. A recombinant molecule comprising a nucleic acid molecule as set forth in Claim 9 operatively linked to a transcription control sequence.
11. A recombinant cell comprising a nucleic acid molecule as set forth in Claim 9.

12. An isolated *Dirofilaria immitis* protein, wherein said *Dirofilaria immitis* protein is encoded by a nucleic acid molecule that hybridizes in a solution comprising 2X SSC and 0% formamide, at a temperature of 37°C, and washing in 1X SSC and 0% formamide at a temperature of 64°C, to a nucleic acid sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:5, SEQ ID NO:7, and SEQ ID NO:10.

13. The protein of Claim 12, wherein said protein comprises an amino acid sequence that is at least about 95% identical to an amino acid sequence selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9, wherein determination of percent identity between molecules is made by a DNAsis™ computer program, using default parameters.

14. The protein of Claim 12, wherein said protein is encoded by a nucleic acid molecule having a nucleic acid sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:5, SEQ ID NO:7, and SEQ ID NO:10.

15. The protein of Claim 12, wherein said protein comprises an amino acid sequence selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9.

16. An isolated antibody that selectively binds to a protein as set forth in Claim 12.

17. A method to identify a compound capable of inhibiting filariid cuticlin activity, said method comprising contacting an isolated *Dirofilaria immitis* cuticlin protein as set forth in Claim 12, with a putative inhibitory compound under conditions in which, in the absence of said compound, said protein has cuticlin activity, and determining if said putative inhibitory compound inhibits said activity.

18. A therapeutic composition that, when administered to a host animal, inhibits molting of filariid larvae, said therapeutic composition comprising: an excipient; and a protective compound selected from the group consisting of: (a) an isolated *Dirofilaria immitis* protein encoded by a nucleic acid molecule that hybridizes in a solution comprising 2X SSC and 0% formamide, at a temperature of 37°C, and washing in 1X SSC and 0% formamide at a temperature of 64°C, to a nucleic acid sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:5, SEQ ID NO:7, and SEQ ID NO:10; (b) an isolated protein selected from the group consisting of (i) a protein comprising an amino acid sequence selected from the group consisting of SEQ ID NO:4, SEQ ID NO:9, and SEQ ID NO:17, and (ii) an isolated *Dirofilaria immitis* protein comprising a homologue of a protein of (i), wherein said homologue comprises at least one epitope that elicits an immune response against a protein selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9, and wherein said homologue has at least a 15 contiguous amino acid portion identical in sequence to a 15 contiguous amino acid portion of a sequence selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9; (c) an isolated *Dirofilaria immitis* nucleic acid molecule that hybridizes in a solution comprising 2X SSC and 0% formamide, at a temperature of 37°C, and washing in 1X SSC and 0% formamide at a temperature of 64°C, to a nucleic acid sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, and SEQ ID NO:10; (d) an isolated nucleic acid molecule selected from the group consisting of (i) an isolated nucleic acid molecule comprising a nucleic acid sequence selected from the group

consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6,
SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:10, SEQ ID NO:16, and SEQ ID NO:18, and
(ii) an isolated *Dirofilaria immitis* nucleic acid molecule comprising a homologue of any
of said nucleic acid molecules of (i), or a complement of any of said homologues,
5 wherein said homologue encodes a protein that elicits an immune response against a
protein selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9, and
wherein said homologue has at least a 50 contiguous nucleotide portion identical in
sequence to a 50 contiguous nucleotide portion of a sequence selected from the group
consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6,
10 SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:10, (e) an isolated antibody that selectively
binds to a protein having an amino acid sequence selected from the group consisting of
SEQ ID NO:4 and SEQ ID NO:9; and (f) an inhibitor of filariid cuticlin activity identified
by its ability to inhibit the activity of a filariid cuticlin protein having an amino acid
sequence selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9.

- 15 19. The composition of Claim 18, wherein said composition further comprises
a component selected from the group consisting of an adjuvant and a carrier.

20. A method to inhibit molting of filariid larvae in an animal, said method comprising administering to said animal a composition comprising a protective compound selected from the group consisting of: (a) an isolated *Dirofilaria immitis* protein encoded by a nucleic acid molecule that hybridizes in a solution comprising 2X SSC and 0% formamide, at a temperature of 37°C, and washing in 1X SSC and 0% formamide at a temperature of 64°C, to a nucleic acid sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:5, SEQ ID NO:7, and SEQ ID NO:10; (b) an isolated protein selected from the group consisting of (i) a protein comprising an amino acid sequence selected from the group consisting of SEQ ID NO:4, SEQ ID NO:9, and SEQ ID NO:17, and (ii) an isolated *Dirofilaria immitis* protein comprising a homologue of a protein of (i), wherein said homologue comprises at least one epitope that elicits an immune response against a protein selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9, and wherein said homologue has at least a 15 contiguous amino acid portion identical in sequence to a 15 contiguous amino acid portion of a sequence selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9; (c) an isolated *Dirofilaria immitis* nucleic acid molecule that hybridizes in a solution comprising 2X SSC and 0% formamide, at a temperature of 37°C, and washing in 1X SSC and 0% formamide at a temperature of 64°C, to a nucleic acid sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, and SEQ ID NO:10; (d) an isolated nucleic acid molecule selected from the group consisting of (i) an isolated nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO:1, SEQ ID

NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:10, SEQ ID NO:16, and SEQ ID NO:18, and (ii) an isolated *Dirofilaria immitis* nucleic acid molecule comprising a homologue of any of said nucleic acid molecules of (i), or a complement of any of said homologues, wherein said homologue encodes a protein that elicits an immune response against a protein selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9, and wherein said homologue has at least a 50 contiguous nucleotide portion identical in sequence to a 50 contiguous nucleotide portion of a sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:10; (e) an isolated antibody that selectively binds to a protein having an amino acid sequence selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9; and (f) an inhibitor of filariid cuticlin activity identified by its ability to inhibit the activity of a filariid cuticlin protein having an amino acid sequence selected from the group consisting of SEQ ID NO:4 and SEQ ID NO:9.

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